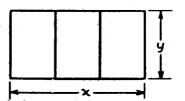
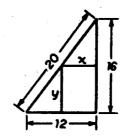
SECTION 6.2

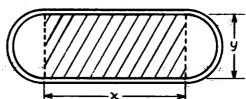
- 6.2.1 Express the number 25 as a sum of two nonnegative terms whose product is as large as possible.
- 6.2.2 A rectangular lot is to be bounded by a fence on three sides and by a wall on the fourth side. Two kinds of fencing will be used with heavy duty fencing selling for \$4 a foot on the side opposite the wall. The two remaining sides will use standard fencing selling for \$3 a foot. What are the dimensions of the rectangular plot of greatest area that can be fenced in at a cost of \$6600?
- **6.2.3** A sheet of cardboard 18 in square is used to make an open box by cutting squares of equal size from the corners and folding up the sides. What size squares should be cut to obtain a box with largest possible volume?
- **6.2.4** Prove that (2,0) is the closest point on the curve $x^2 + y^2 = 4$ to (4,0).
- **6.2.5** Find the dimensions of the rectangle of greatest area that can be inscribed in a circle of radius a.
- 6.2.6 A divided field is to be constructed with 4000 feet of fence as shown. For what value of x will the area be a maximum?



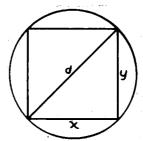
6.2.7 Find the dimensions of the rectangle of maximum area which may be embedded in a right triangle with sides of length 12, 16, and 20 feet as shown in the figure.



6.2.8 The infield of a 440 yard track consists of a rectangle and 2 semicircles. To what dimensions should the track be built in order to maximize the area of the rectangle?



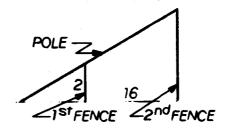
- **6.2.9** A long strip of copper 8 inches wide is to be made into a rain gutter by turning up the sides to form a trough with a rectangular cross section. Find the dimensions of the cross section if the carrying capacity of the trough is to be a maximum.
- 6.2.10 An isosceles triangle is drawn with its vertex at the origin and its base parallel to the x axis. The vertices of the base are on the curve $5y = 25 x^2$. Find the area of the largest such triangle.
- 6.2.11 The strength of a beam with a rectangular cross section varies directly as x and as the square of y. What are the dimensions of the strongest beam that can be sawed out of a round log whose diameter is d? See figure on right.



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6.2.26 The product of 2 positive numbers is 48. Find the numbers, if the sum of one number and the cube of the other is to be minimum.

- **6.2.27** Find values for x and y such that their product is a minimum if y = 2x 10.
- 6.2.28 A container with a square base, vertical sides and open top is to be made from 192 ft² of material. Find the dimensions of the container with greatest volume.
- 6.2.29 The cost of fuel used in propelling a dirigible varies as the square of its speed and is \$200/hour when the speed is 100 miles/hour. Other expenses amount to \$300/hour. Find the most economical speed for a voyage of 1000 miles.
- 6.2.30 A rectangular garden is to be laid out with one side adjoining a neighbor's lot and is to contain 675 ft². If the neighbor agrees to pay for half the dividing fence, what should the dimensions of the garden be to insure a minimum cost of enclosure?
- 6.2.31 A rectangle is to have an area of 32 in². What should be its dimensions if the distance from one corner to the mid-point of a nonadjacent side is to be a minimum?
- **6.2.32** A slice of pizza, in the form of a sector of a circle, is to have a perimeter of 24 inches. What should be the radius of the pan to make the slice of pizza largest. (Hint: the area of a sector of a circle, $A = \frac{r^2}{2}\theta$ where θ is the central angle in radian and the arc length along a circle is $S = r\theta$ with θ in radians.)
- **6.2.33** Find the point on the parabola $2y = x^2$ which is closest to (4,1).
- **6.2.34** A line is drawn through the point P(3,4) so that it intersects the y-axis at A(0,y) and the x-axis at B(x,0). Find the smallest triangle formed if x and y are positive.
- 6.2.35 An open cylindrical trash can is to hold 6 cubic feet of material. What should be its dimensions if the cost of material used is to be a minimum? [Surface Area, $S = 2\pi rh$ where r = radius and h = height.]
- 6.2.36 Two fences, 16 feet apart are to be constructed so that the first fence is 2 feet high and the second fence is higher than the first. What is the length of the shortest pole that has one end on the ground, passing over the first fence and reaches the second fence? See figure.



6.2.37 A line is drawn through the point P(3,4) so that it intersects the y-axis at A(0,y) and the x-axis at B(x,0). Find the equation of the line through AB if the triangle formed is to have a minimum area and both x and y are positive.